

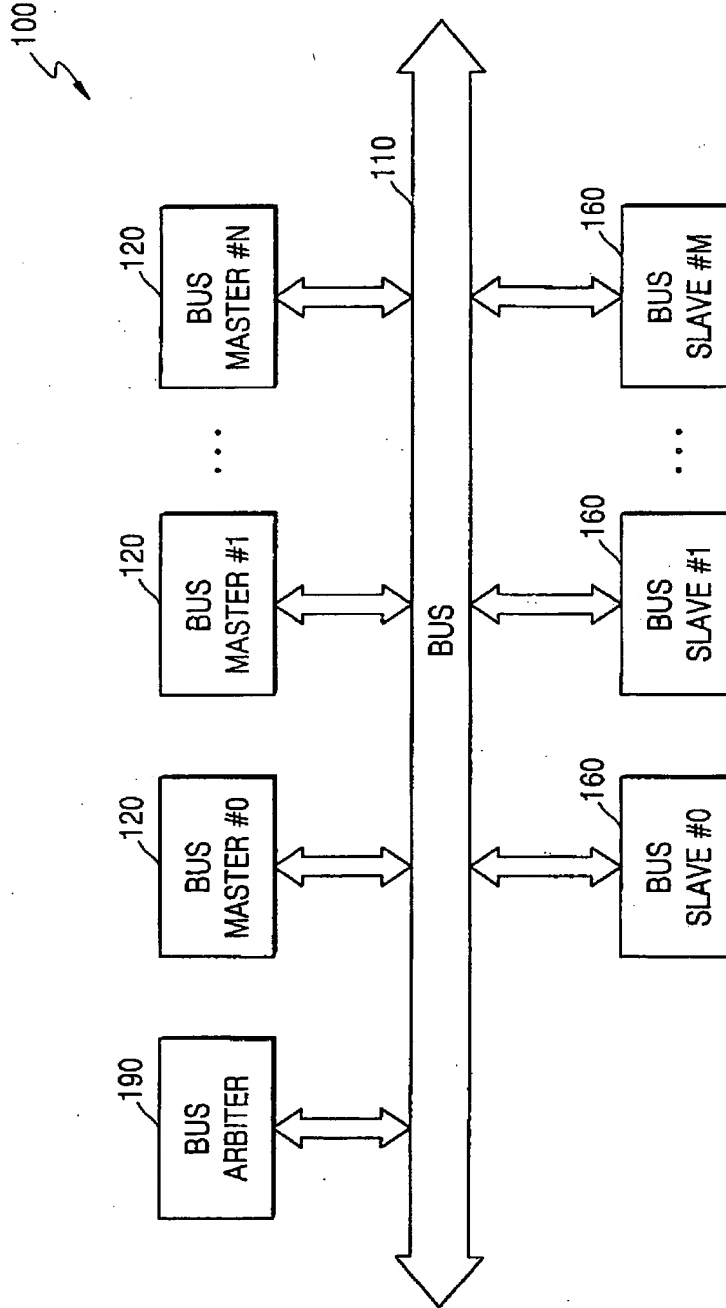
Young-Sik KIM, et al.

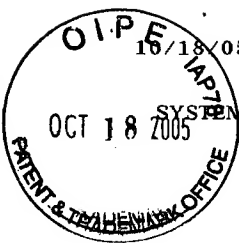
SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES
FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

1/22

FIG. 1 (PRIOR ART)

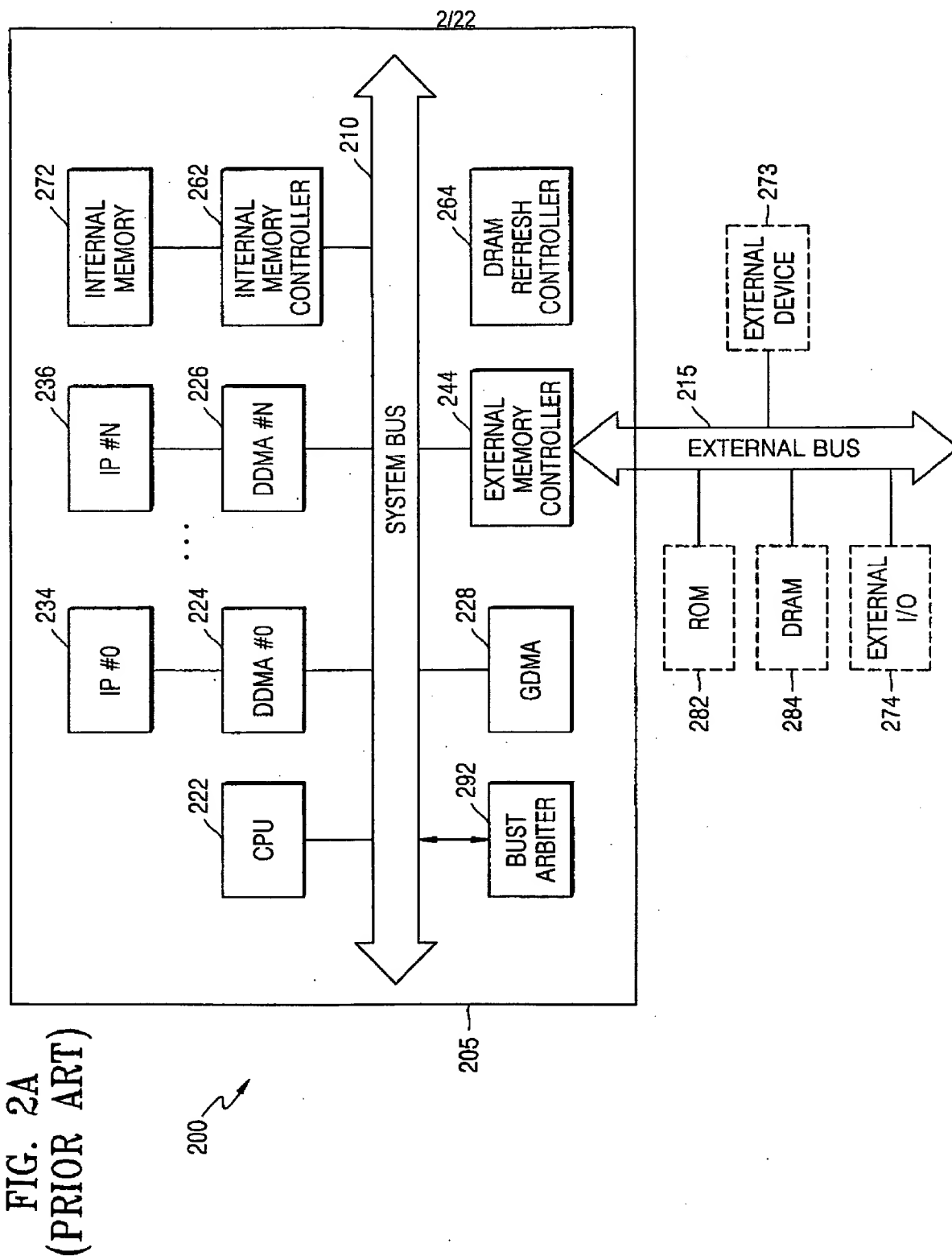




Young-Sik KIM, et al.

SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874





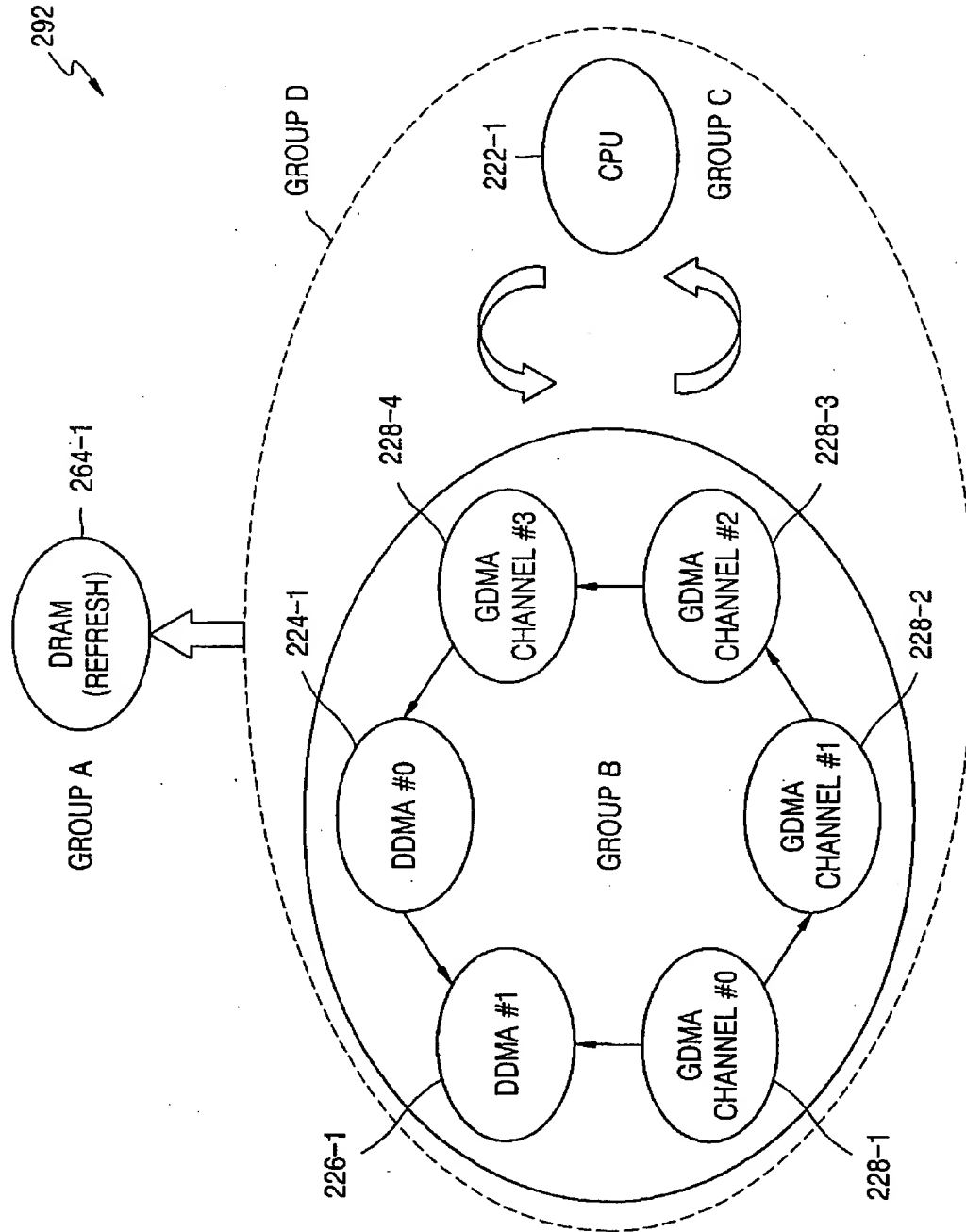
Young-Sik KIM, et al.

SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

3/22

FIG. 2B (PRIOR ART)





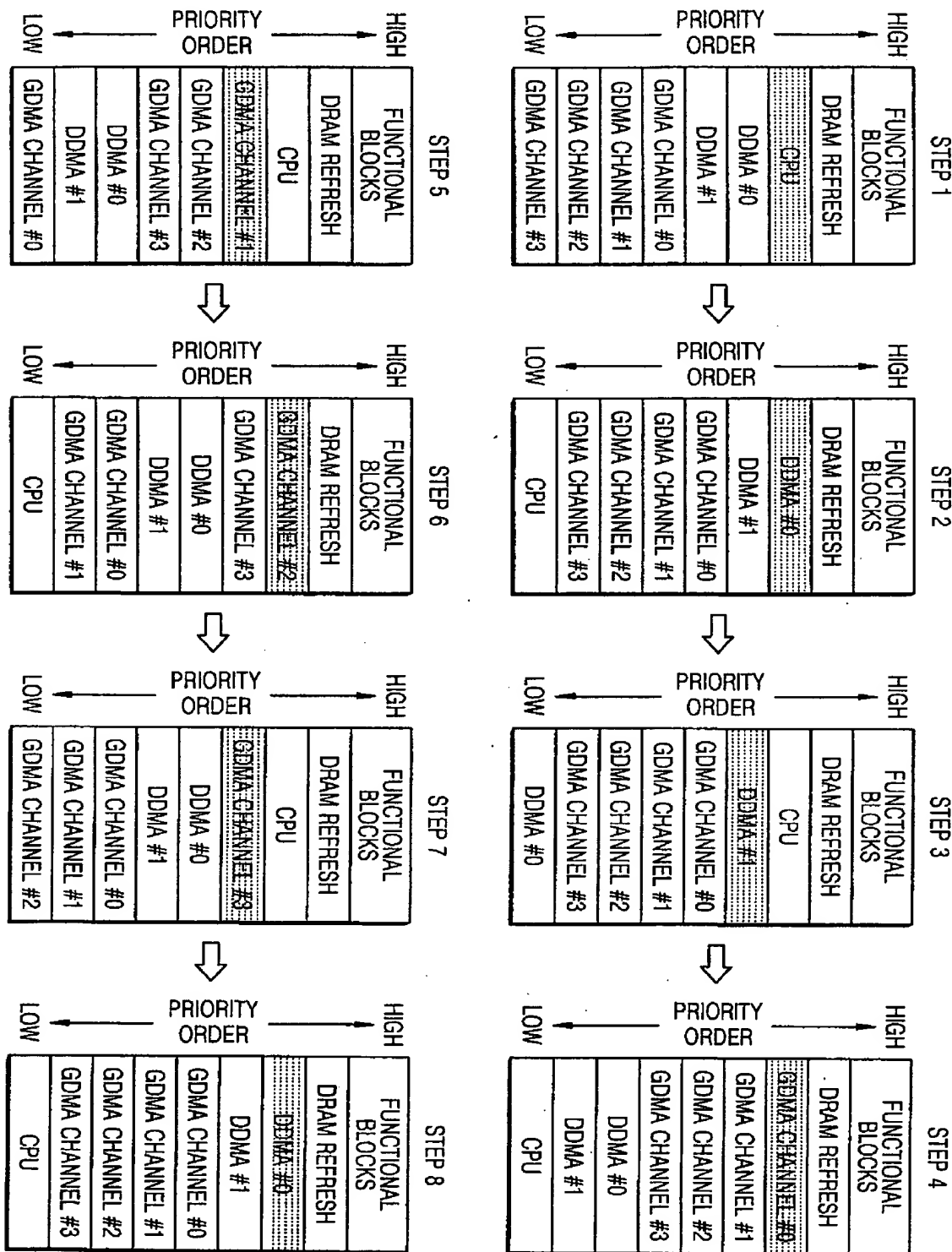
Young-Sik KIM, et al.

ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

4/22

FIG. 2C (PRIOR ART)



OIPE 12285
 10/18/2005
 OCT 18 2005
 PATENT & TRADEMARK OFFICE

11:34 FAX 5032744622

MARGER JOHNSON

007

Young-Sik KIM, et al.

SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES
 FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

5/22

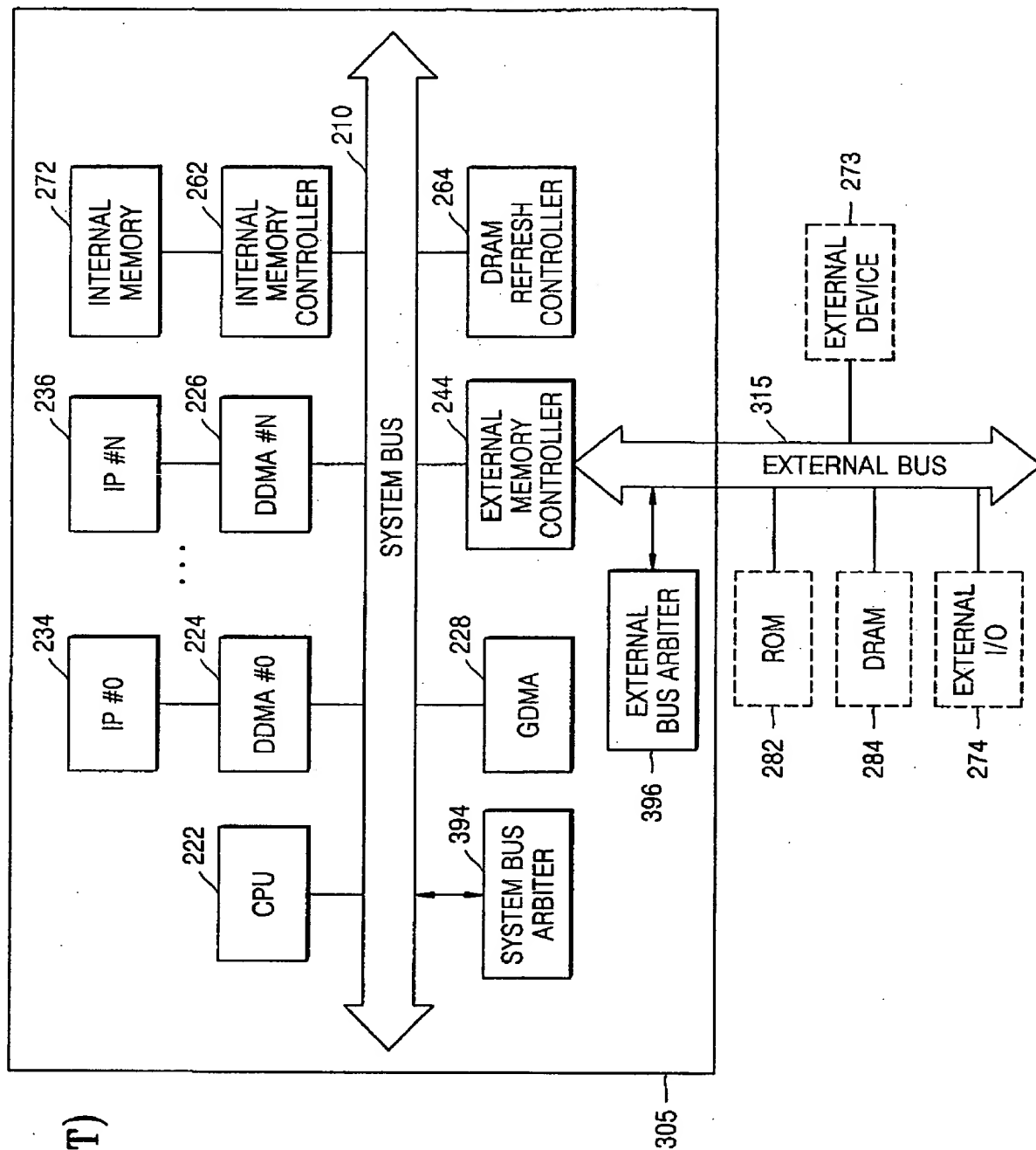
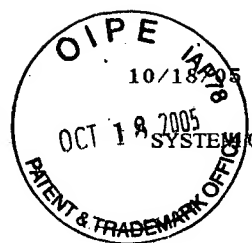


FIG. 3A
(PRIOR ART)



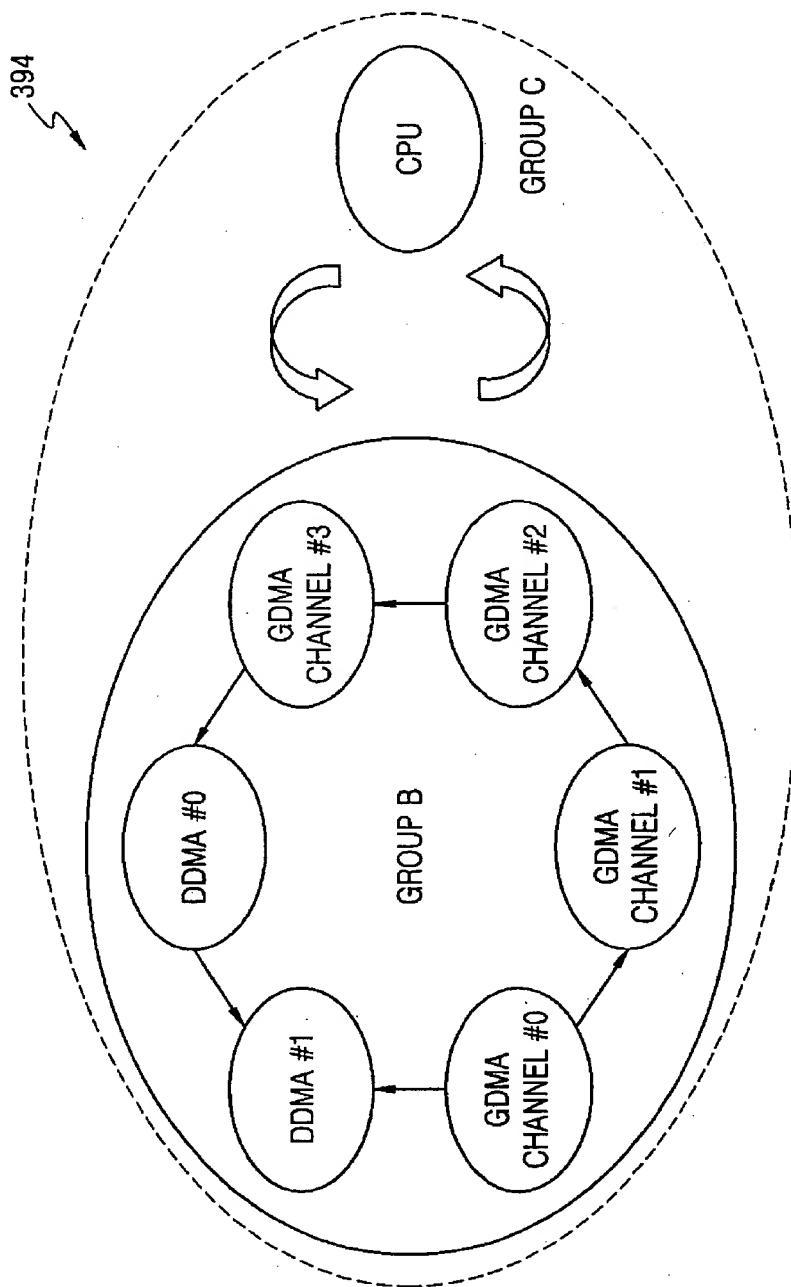
Young-Sik KIM, et al.

SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

6/22

FIG. 3B (PRIOR ART)





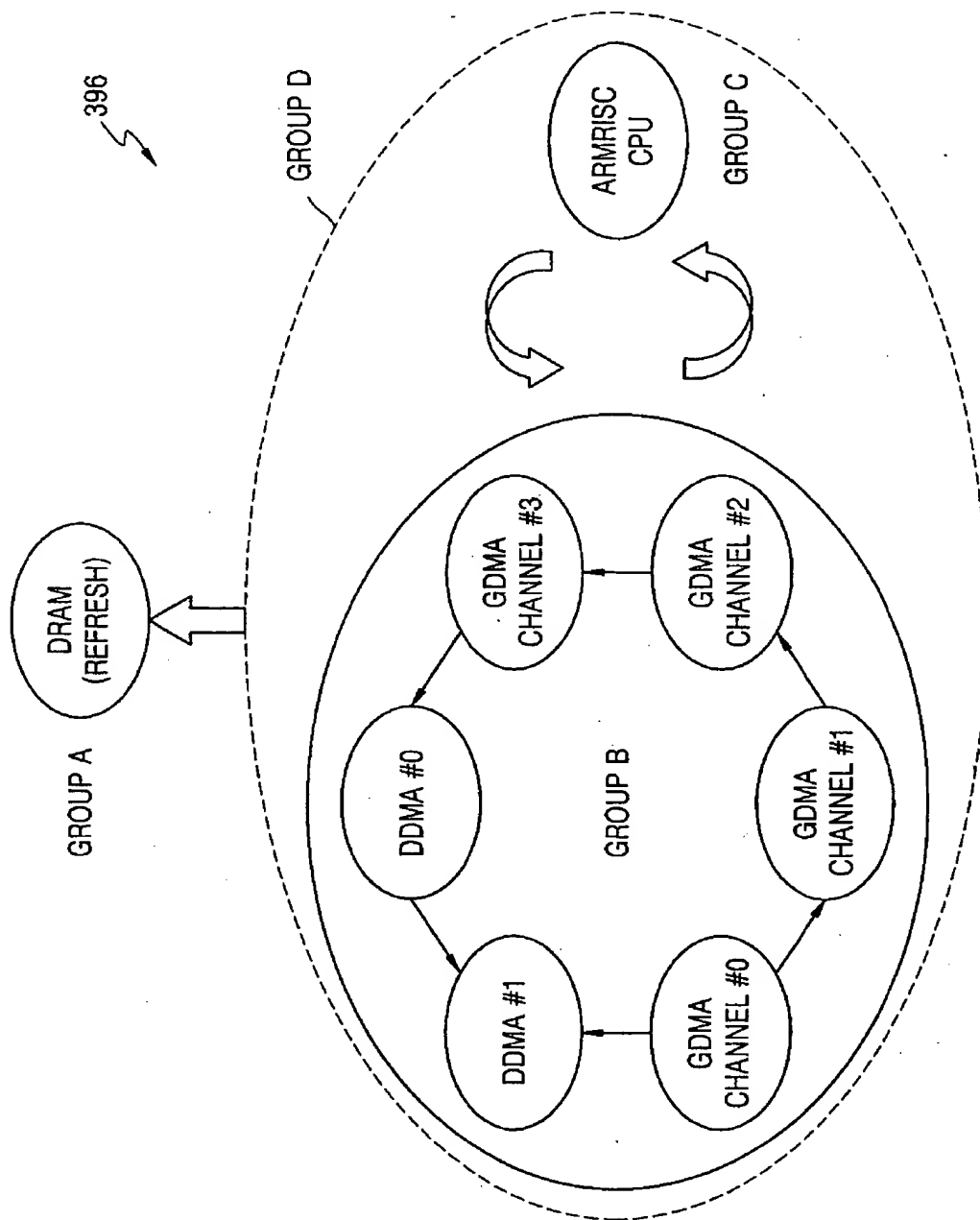
Young-Sik KIM, et al.

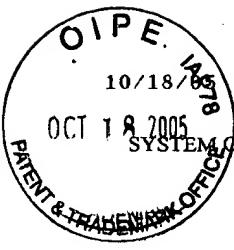
A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

7/22

FIG. 3C (PRIOR ART)





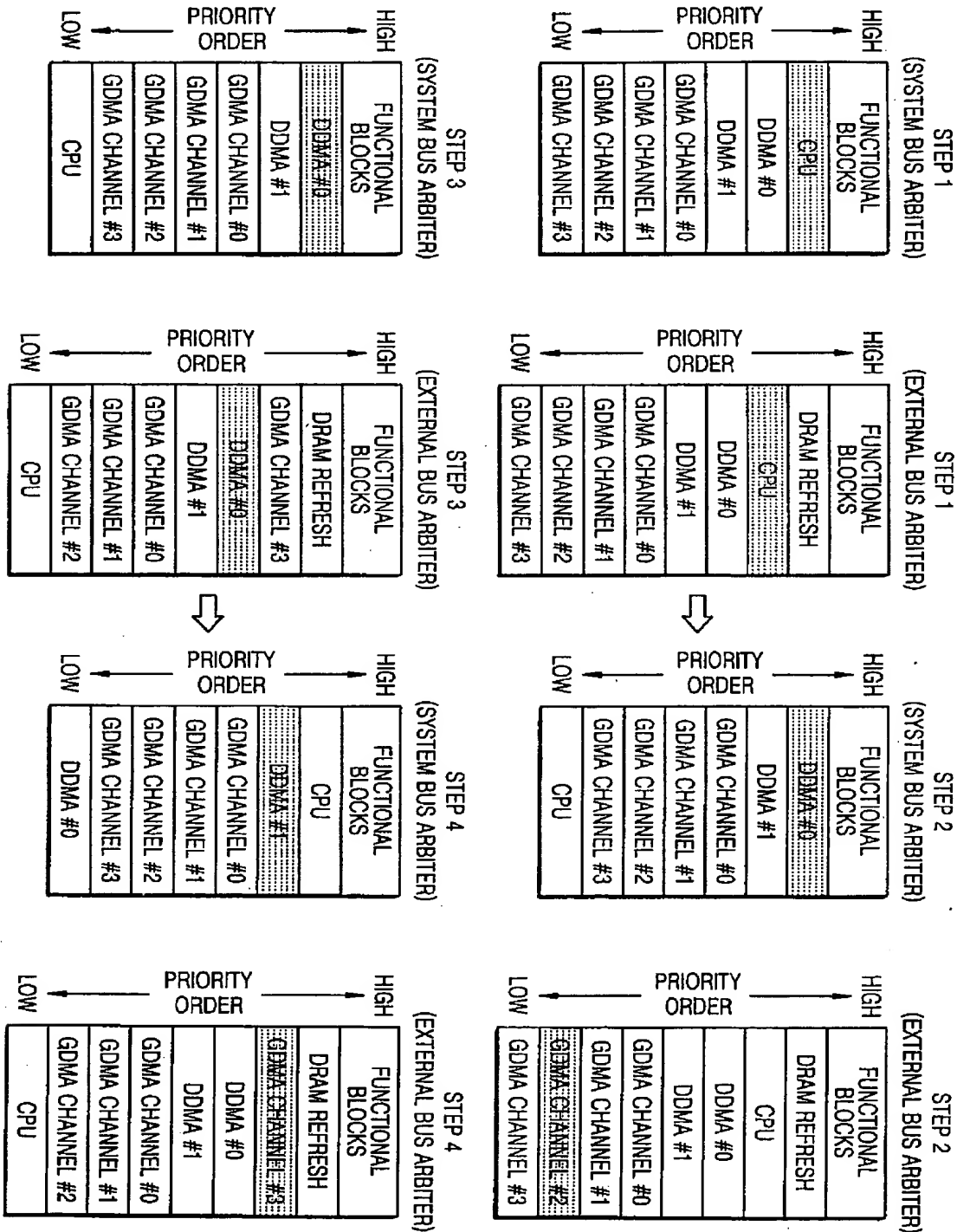
Young-Sik KIM, et al.

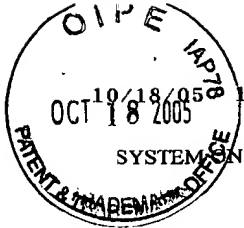
SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

8/22

FIG. 3D-1 (PRIOR ART)





MARGER JOHNSON

011

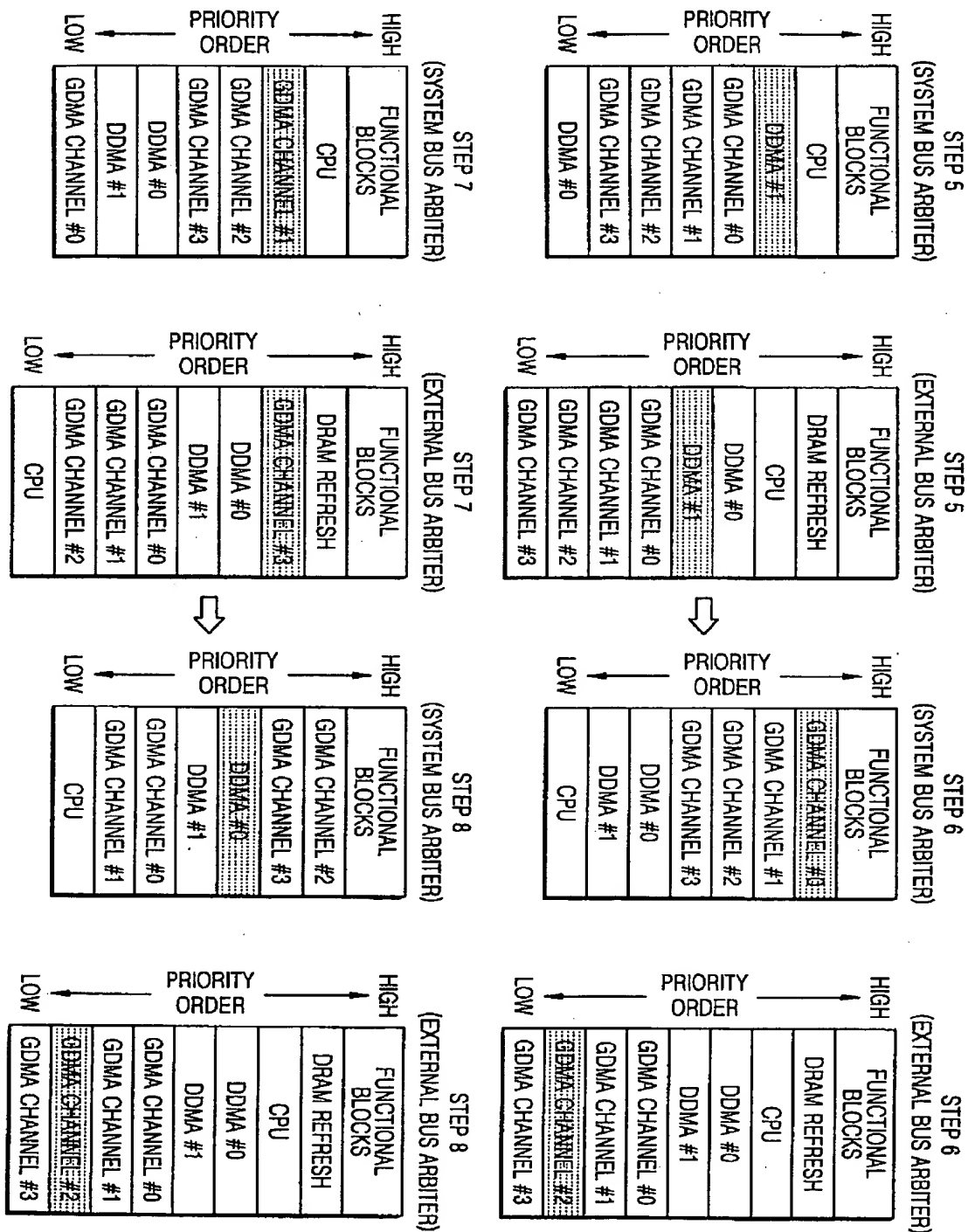
Young-Sik KIM, et al.

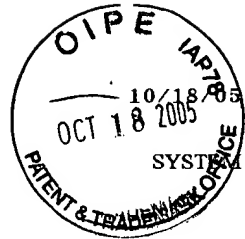
SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

9/22

FIG. 3D-2 (PRIOR ART)



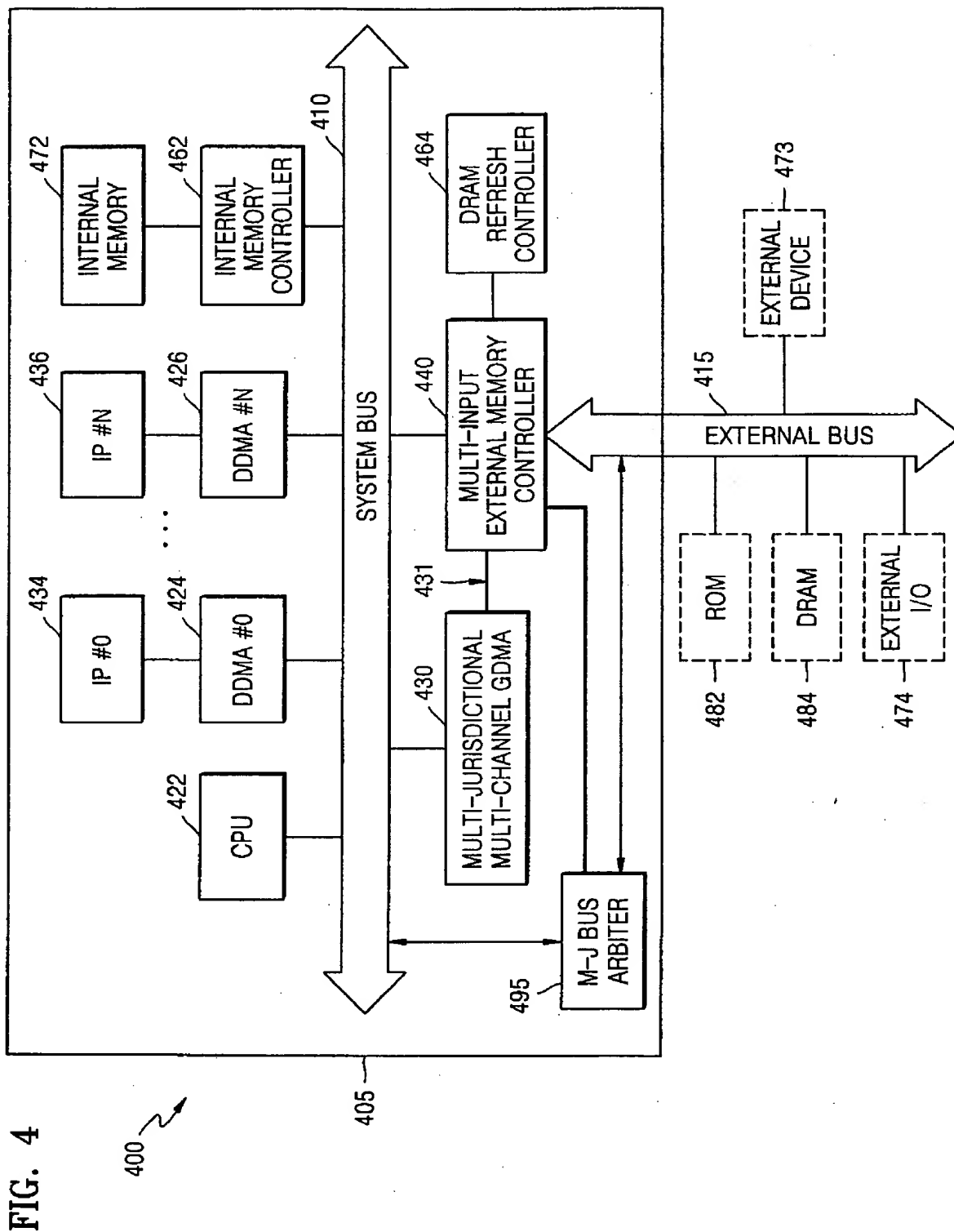


Young-Sik KIM, et al.

SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

10/22





10/18/05
OCT 18 2005

11:36 FAX 5032744622

MARGER JOHNSON

013

Young-Sik KIM, et al.

SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

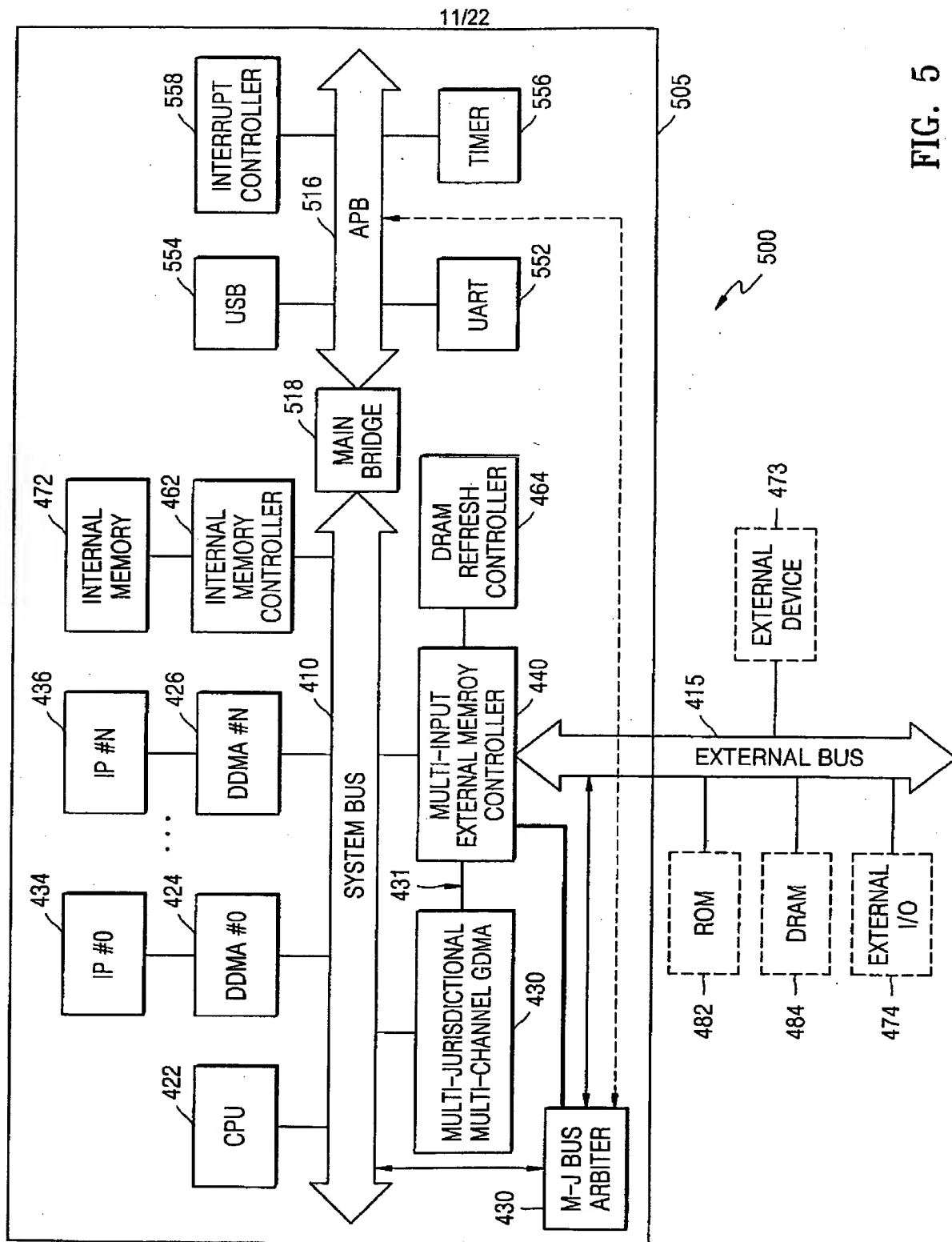
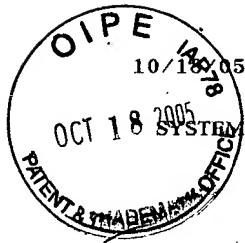


FIG. 5



Young-Sik KIM, et al.

SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES
FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

12/22

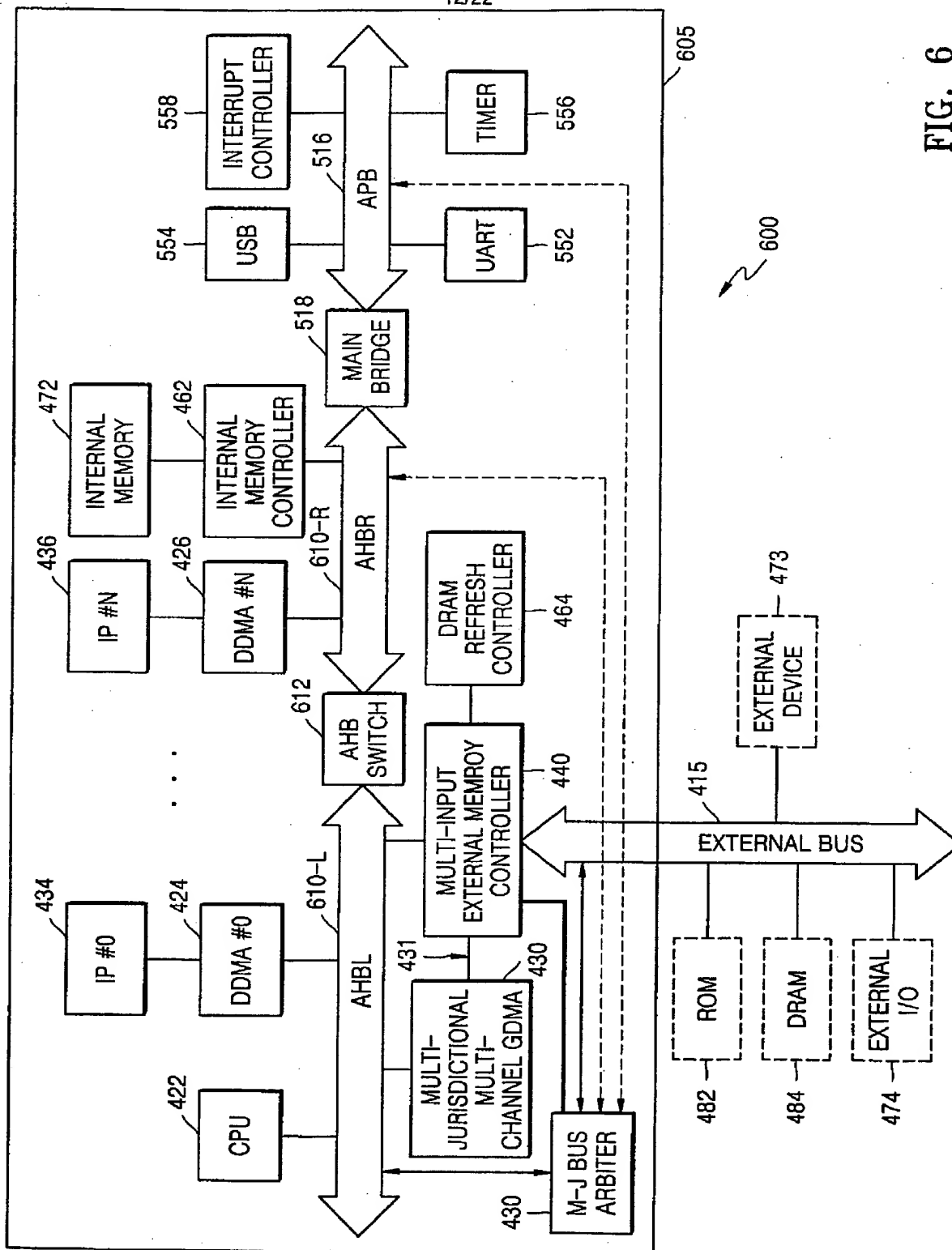
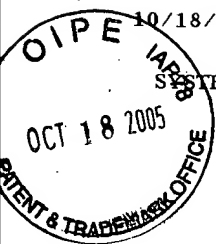


FIG. 6



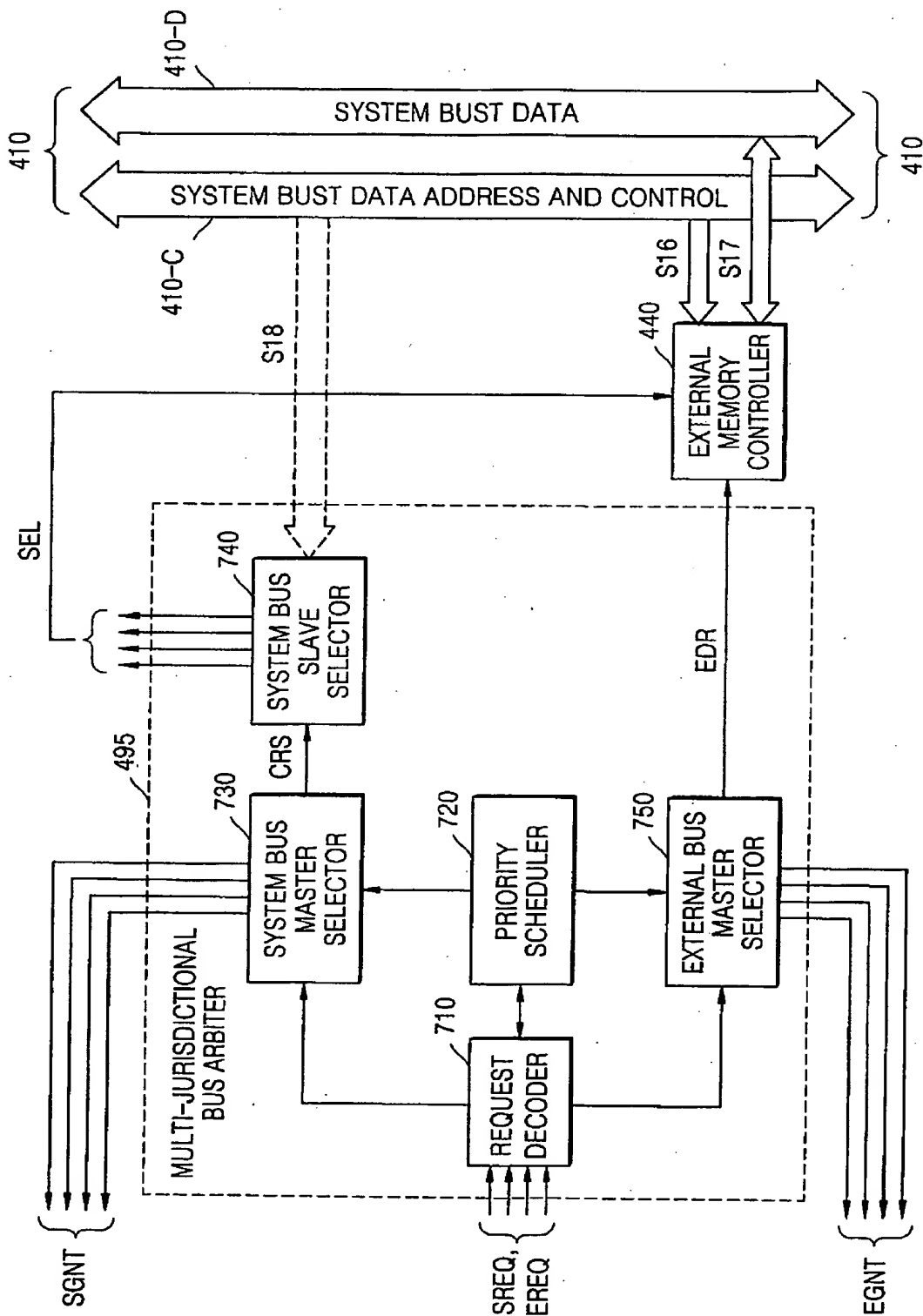
Young-Sik KIM, et al.

SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

13/22

FIG. 7



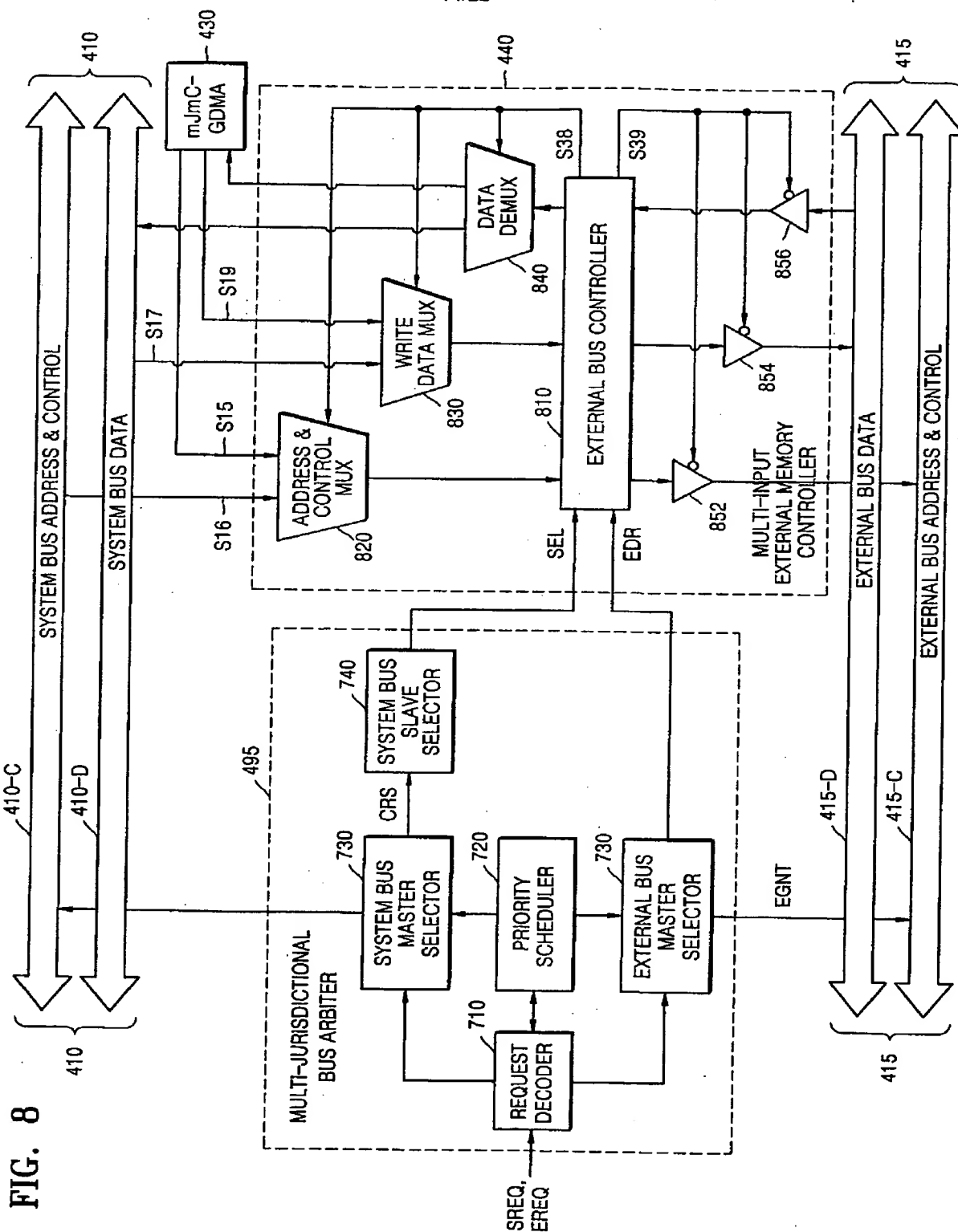


Young-Sik KIM, et al.

SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

14/22





10/18/05 11:37 FAX 5032744622

MARGER JOHNSON

017

Young-Sik KIM, et al.

SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

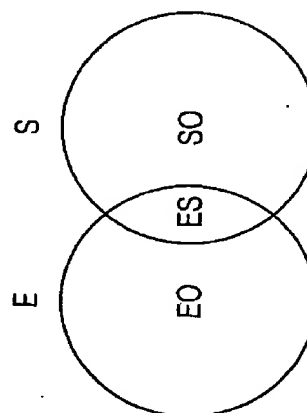
Attorney Docket No. 9898-172/Application No. 09/773,874

15/22

FIG. 9

	EXTERNAL BUS MASTER	SYSTEM BUS MASTER	
		SYSTEM BUS ONLY REQ[1:0]=2' b01	BOTH BUSES REQ[1:0]=2' b11
	EXTERNAL BUS ONLY REQ[1:0]=2' b10		
NO REQUEST REQ[1:0]=2' b00			
DRAM REFRESH CONTROLLER	0	X	X
CPU	0	0	0
DDMA BLOCK	0	0	0
GDMA CHANNEL	0	0	0
EXTERNAL DEVICE	0	X	X

FIG. 10





Young-Sik KIM, et al.

SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

16/22

FIG. 11

CLASSIFICATION OF SET	ELEMENT
SET OF FUNCTIONAL BLOCKS MAKING A SYSTEM BUS REQUEST (SYSTEM BUS MASTER S)	CPU, DDMA BLOCK, AND GDMA BLOCK
SET OF FUNCTIONAL BLOCKS MAKING AN EXTERNAL BUS REQUEST (E)	DRAM REFRESH CONTROLLER, CPU, DDMA BLOCK, GDMA CHANNEL, AND EXTERNAL DEVICE
SET OF FUNCTIONAL BLOCKS MAKING ONLY A SYSTEM BUS REQUEST (SO)	CPU
SET OF FUNCTIONAL BLOCKS MAKING ONLY AN EXTERNAL BUS REQUEST (EO)	DRAM REFRESH CONTROLLER, GDMA CHANNEL, AND EXTERNAL DEVICE
SET OF FUNCTIONAL BLOCKS MAKING A REQUEST FOR BOTH SYSTEM BUS AND EXTERNAL BUS (ES)	CPU, DDMA BLOCK, AND GDMA CHANNEL
SET OF FUNCTIONAL BLOCKS MAKING REQUESTS FOR A SYSTEM BUS OR AN EXTERNAL BUS (A)	DRAM REFRESH CONTROLLER, CPU, DDMA BLOCK, GDMA CHANNEL, AND EXTERNAL DEVICE

OIPE
 10/18/05
 OCT 18 2005
 PATENT & TRADEMARK OFFICE

11:37 FAX 5032744622

MARGER JOHNSON

019

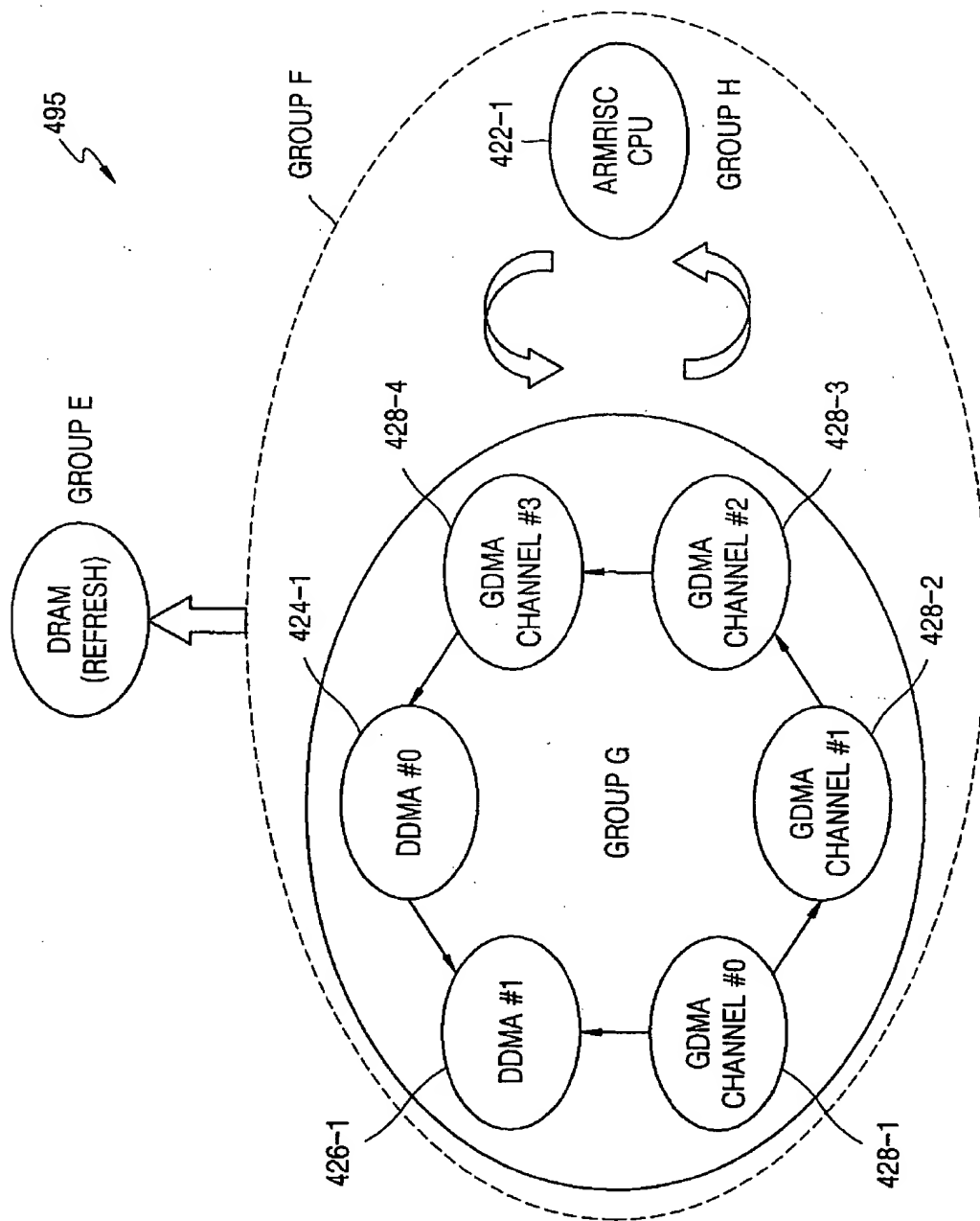
Young-Sik KIM, et al.

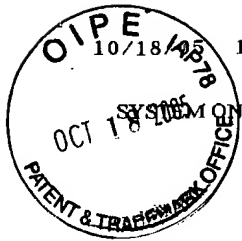
SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

17/22

FIG. 12





10/18/05

11:37 FAX 5032744622

MARGER JOHNSON

020

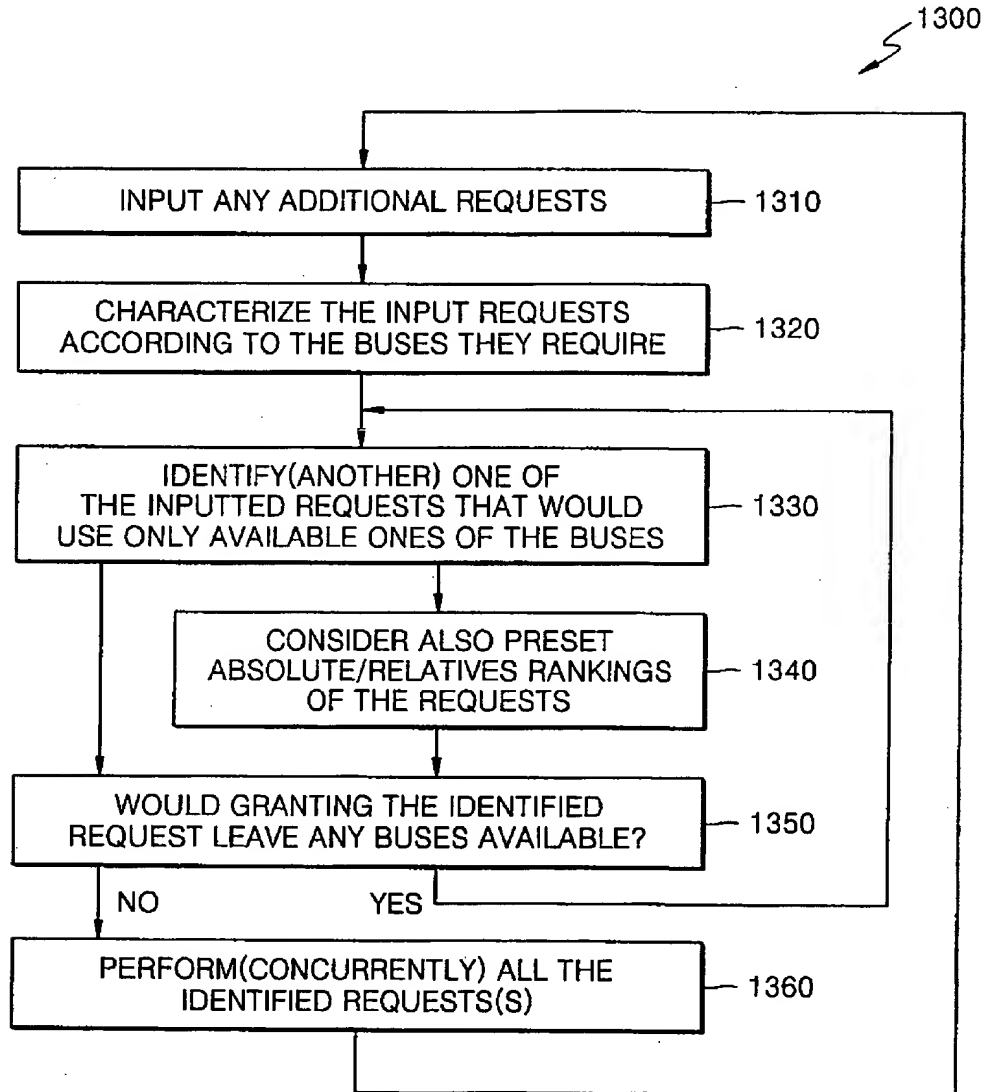
Young-Sik KIM, et al.

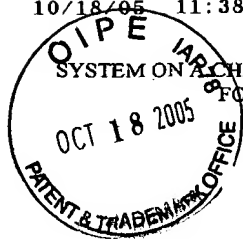
SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

18/22

FIG. 13

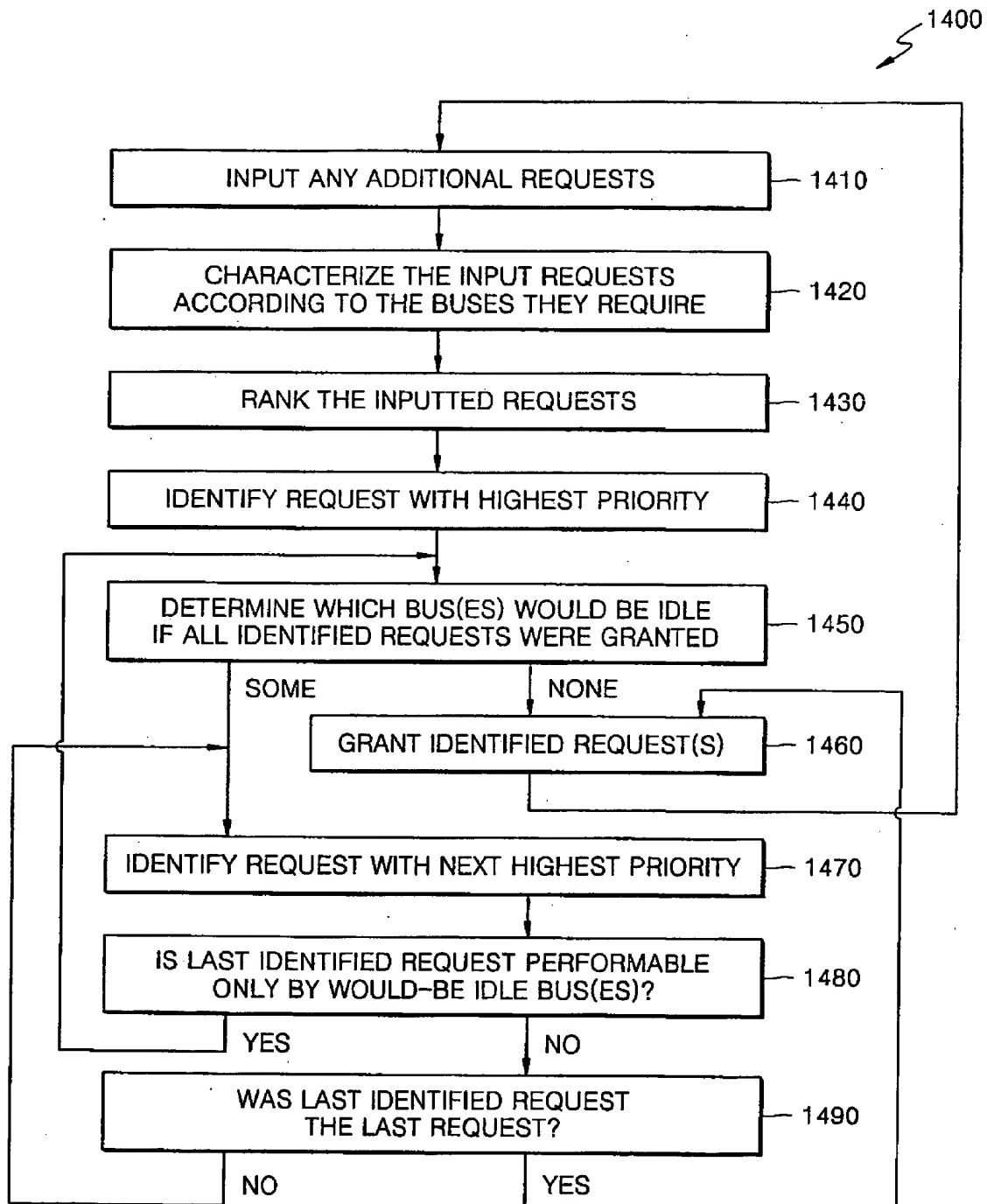


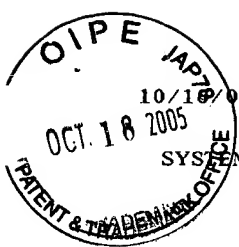


SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES
Attorney Docket No. 9898-172/Application No. 09/773,874

19/22

FIG. 14





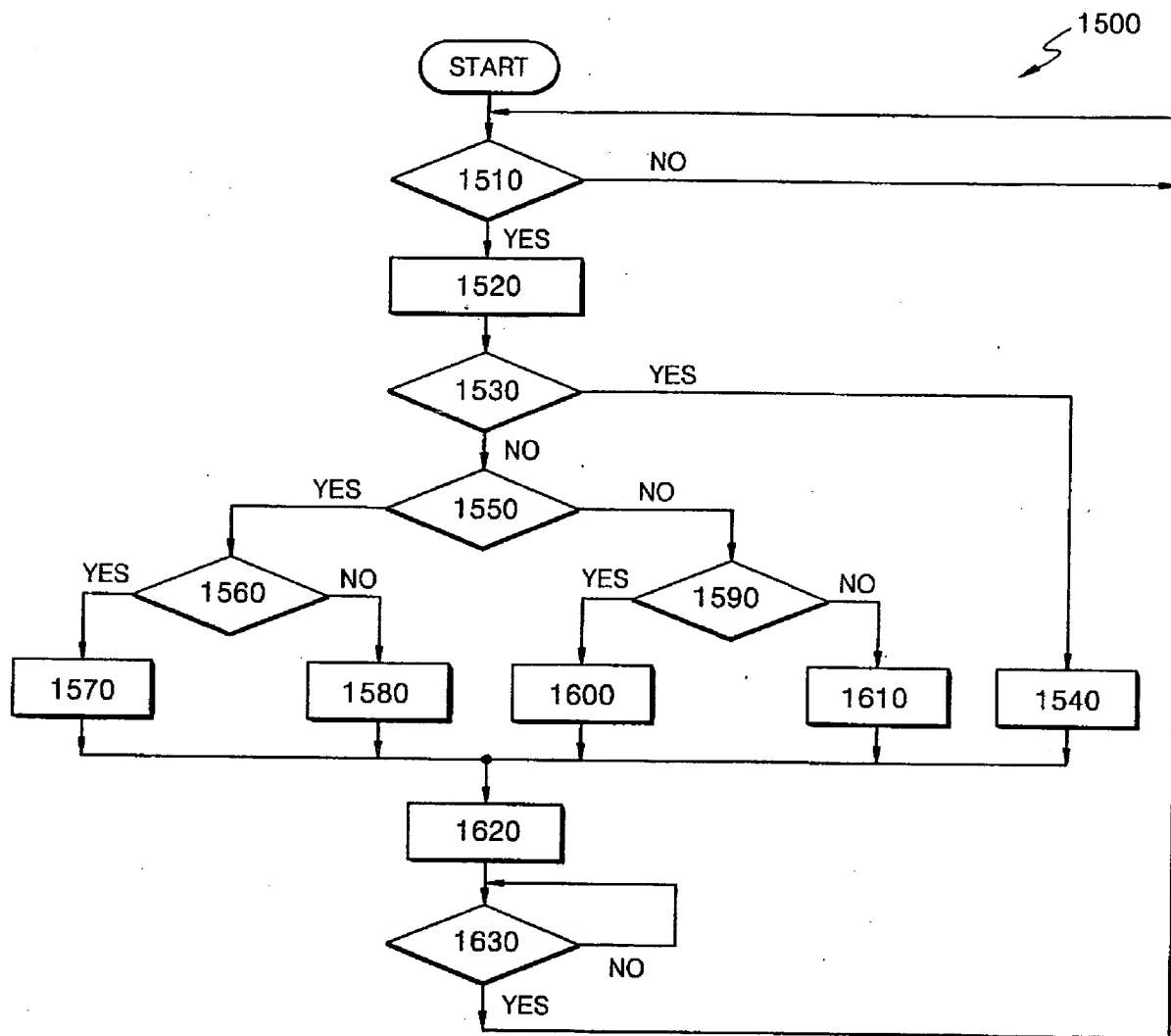
Young-Sik KIM, et al.

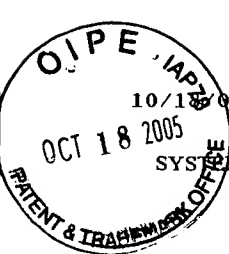
SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

20/22

FIG. 15

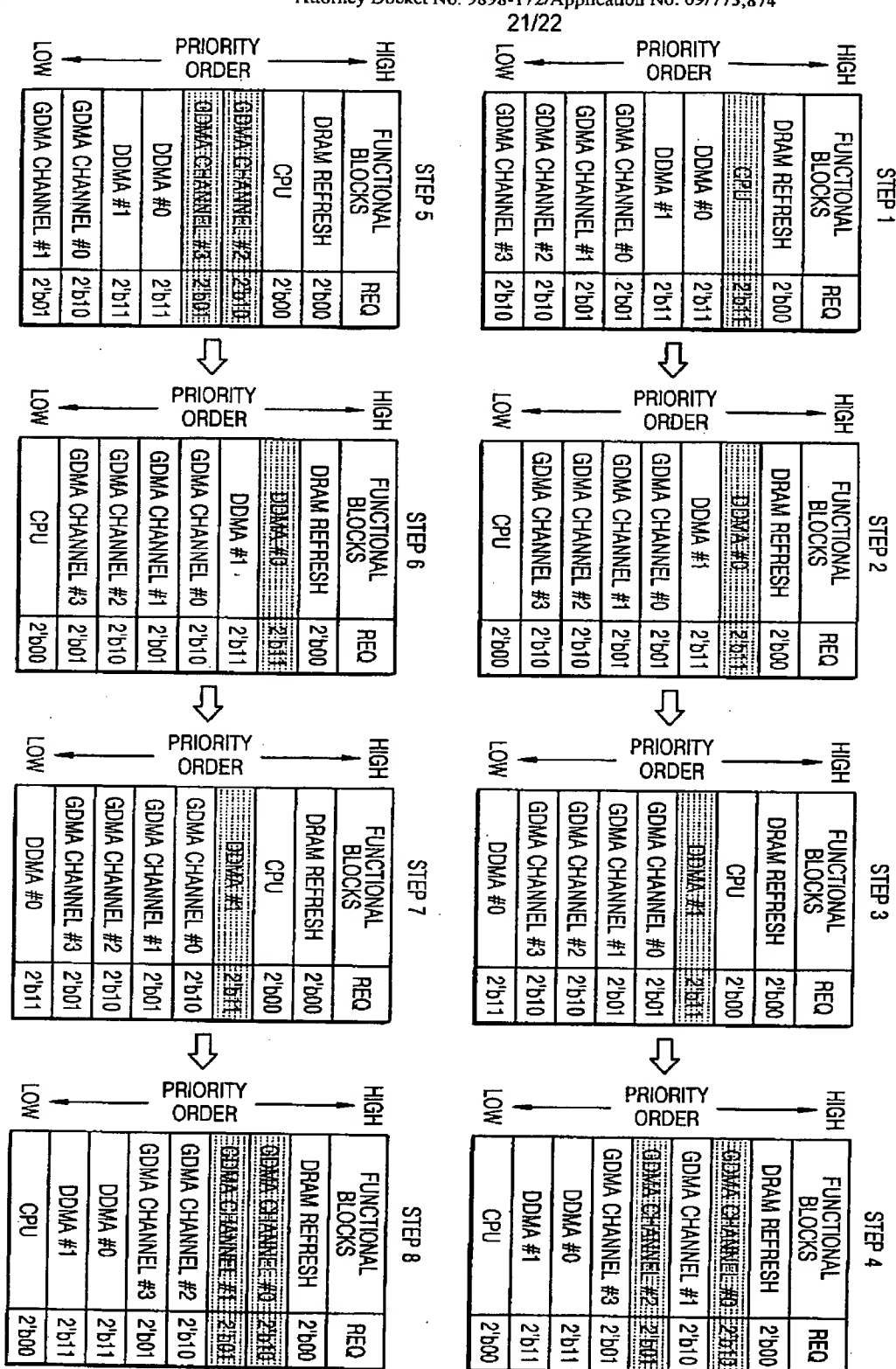




Young-Sik KIM, et al.

SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874





Young-Sik KIM, et al.

SYSTEM ON A CHIP HAVING A SYSTEM BUS, AN EXTERNAL BUS, AND A BUS ARBITER WITH PROGRAMMABLE PRIORITIES
FOR BOTH BUSES, SOFTWARE, AND METHOD FOR ASSIGNING PROGRAMMABLE PRIORITIES

Attorney Docket No. 9898-172/Application No. 09/773,874

22/22

FIG. 17

ITEM	PROBABILITY THAT ELEMENT HAVING BUS OWNERSHIP PERFORMS OPERATION			BUS UTILIZATION
	ELEMENT OF SET EO	ELEMENT OF SET ES	ELEMENT OF SET SO	
EXCLUSIVE BUS ARBITRATION	$\frac{1}{n(A)}$	$\frac{1}{n(A)}$	$\frac{1}{n(A)}$	$\frac{n(EO)+2n(EO)+n(SO)}{2n(A)}$
HIERACHICAL BUS ARBITRATION	$\frac{n(ES)+2n(SO)}{2n(S)n(EO)}$	$\frac{1}{2n(S)}$	$\frac{1}{n(A)}$	$\frac{4n(SO)+3n(ES)}{4n(S)}$
PRESENT INVENTION	$\frac{n(EO)+n(SO)}{n(A)n(EO)}$	$\frac{1}{n(A)}$	$\frac{n(EO)+n(SO)}{n(A)n(SO)}$	1